

What is claimed as new and is desired to be secured by letters patent of the United States is:

1. A method of feeding sheets, the method comprising the steps of:
conveying the sheets between a feed roller and a separation member, wherein said separation member is pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation member;
separating and conveying the sheets conveyed between said feed roller and said separation member one by one; and
providing a cyclic change in the pressure applied between said feed roller and said separation member.
2. The method of claim 1, wherein the cyclic change in the pressure is provided from a side of said feed roller.
3. The method of claim 1, wherein the cyclic change in the pressure is provided at a low frequency.
4. The method of claim 1, wherein said feed roller is cyclically pressed for providing the cyclic change in the pressure.
5. A sheet feeding device comprising:
a feed roller;
a separation member pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation member, wherein sheets conveyed into a position between said feed roller and said separation member are separated and conveyed one by one; and
a pressing device configured to cyclically provide a change in the pressure applied between said feed roller and said separation member.
6. The sheet feeding device of claim 5, wherein said pressing device is arranged at a side of the sheets, when the sheets are separated and conveyed one by one.
7. The sheet feeding device of claim 6, wherein said pressing device is provided on the feed roller.
8. The sheet feeding device of claim 7, wherein said pressing device includes a cam.
9. The sheet feeding device of claim 8, further comprising a driving system configured to drive said feed roller, and wherein said pressing device includes a driving motor which is independent of said driving system configured to drive said feed roller.

10. The sheet feeding device of claim 9, wherein said driving motor is selectively driven.

11. The sheet feeding device of claim 9, wherein a rotation speed of said driving motor is variable.

12. The sheet feeding device of claim 7, wherein said pressing device uses a magnetic force.

13. The sheet feeding device of claim 8, further comprising a driving system configured to drive said feed roller, and wherein said pressing device is driven by a driving force from said driving system configured to drive said feed roller.

14. The sheet feeding device of claim 5, wherein said separation member is chose from a group consisting of: 1) a friction pad elastically pressed against and into contact with said feed roller; 2) a friction roller upwardly and elastically supported by an axis, said axis being rotated by a driving gear and a gear engaged with said driving gear and supported at one side thereof, and said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet feeding direction; and 3) a reverse roller upwardly and elastically supported by an axis, said axis being rotated by a driving gear and a gear engaged with said driving gear and supported at one side thereof, said reverse roller being arranged at a free end side of the axis via a torque limiter, so as to be rotated in a sheet feeding direction and a direction opposite the sheet feeding direction.

15. A sheet feeding device comprising:

a feed roller;

a reverse roller pressed against and into contact with said feed roller with a pressure applied between said feed roller and said reverse roller, said reverse roller being upwardly and elastically supported by an axis, said axis being is supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said reverse roller being supported at a free end side of said axis and arranged via a torque limiter, so as to be rotated in a sheet feeding direction and a direction opposite the sheet feeding direction, wherein sheets conveyed between said feed roller and said reverse roller are separated and are conveyed one by one; and

a pressing device configured to provide a cyclic change in the pressure applied between said feed roller and said reverse roller, said pressing device being arranged at a side of said reverse roller.

16. A sheet feeding device comprising:

a feed roller;

a friction roller pressed against and into contact with said feed roller with a pressure applied between said feed roller and said friction roller, said friction roller being upwardly and elastically supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet feeding direction, wherein sheets conveyed between said feed roller and said friction roller are separated and are conveyed one by one; and

a pressing device configured to provide a cyclic change in the pressure applied between said feed roller and said friction roller, said pressing device being arranged at a side of said friction roller.

17. The sheet feeding device of claim 15, wherein said pressing device uses a magnetic force, and said pressing device provides the cyclic change in the pressure more than one time as said reverse roller makes one rotation.

18. The sheet feeding device of claim 16, wherein said pressing device uses a magnetic force, and said pressing device provides the cyclic change in the pressure more than one time as said friction roller makes one rotation.

19. The sheet feeding device of claim 5, further comprising a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

20. The sheet feeding device of claim 15, further comprising a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

21. The sheet feeding device of claim 16, further comprising a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

22. The sheet feeding device of claim 5, wherein all three, of said feed roller, said separation member, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from an image forming apparatus.

23. The sheet feeding device of claim 15, wherein all three, of said feed roller, said reverse roller, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from an image forming apparatus.

24. The sheet feeding device of claim 16, wherein all three, of said feed roller, said friction roller, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from an image forming apparatus.

25. An image forming apparatus comprising:

an image forming device;

a sheet feeding device configured to convey a sheet to said image forming device, wherein said image forming device is configured to form an image on the sheet conveyed from said sheet feeding device, and said sheet feeding device includes a feed roller and a separation member, said separation member being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation member, wherein a plurality of the sheets conveyed between said feed roller and said separation member are separated and conveyed one by one to said image forming device; and

a pressing device configured to cyclically provide a change in the pressure applied between said feed roller and said separation member.

26. The image forming apparatus of claim 25, wherein said pressing device is arranged at a side of the sheets, when the sheets are separated and conveyed one by one.

27. The image forming apparatus of claim 26, wherein said pressing device is provided on said feed roller.

28. The image forming apparatus of claim 27, wherein said pressing device includes a cam.

29. The image forming apparatus of claim 28, further comprising a driving system configured to drive said feed roller, and wherein said pressing device includes a driving motor which is independent of said driving system configured to drive said feed roller.

30. The image forming apparatus of claim 29, wherein said driving motor is selectively driven.

31. The image forming apparatus of claim 29, wherein a rotation speed of said motor is variable.

32. The image forming apparatus of claim 27, wherein said pressing device uses a magnetic force.

33. The image forming apparatus of claim 28, further comprising a driving system configured to drive said feed roller, and wherein said pressing device is driven by a driving force from said driving system configured to drive said feed roller.

34. The image forming apparatus of claim 25, wherein said sheet separation member is chose from any one of a group consisting of: 1) a friction pad elastically pressed against and into contact with said feed roller; 2) a friction roller upwardly and elastically supported by an axis, said axis being rotated by a driving gear and a gear engaged with said driving gear and supported at one side thereof, and said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet feeding direction; and 3) a reverse roller upwardly and elastically supported by an axis, said axis being rotated by a driving gear and a gear engaged with said driving gear and supported at one side thereof, said reverse roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated in a sheet feeding direction and a direction opposite the sheet feeding direction.

35. An image forming apparatus comprising:

an image forming device; and

a sheet feeding device configured to convey a sheet to said image forming device, wherein said image forming device being configured to form an image on the sheet conveyed from said sheet feeding device, and said sheet feeding device including a feed roller and a reverse roller, wherein said reverse roller is pressed against and into contact with said feed roller with a pressure applied between said feed roller and said reverse roller, said reverse roller being upwardly and elastically supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said reverse roller being supported at a free end side of said axis and arranged via a torque limiter, so as to be rotated in a sheet feeding direction and a direction opposite the sheet feeding direction, wherein a plurality of the sheets conveyed between said feed roller and said reverse roller are separated and are conveyed one by one to the image forming device; and

a pressing device configured to provide a cyclic change in the pressure applied between said feed roller and said reverse roller, said pressing device being arranged at a side of the reverse roller.

36. An image forming apparatus comprising;

an image forming device; and

a sheet feeding device configured to convey a sheet to said image forming device, wherein said image forming device is configured to form an image on the sheet conveyed from said sheet feeding device, and said sheet feeding device including a feed roller and a friction roller, wherein said friction roller is pressed against and into contact with said feed roller with a pressure applied between said feed roller and said friction roller, said friction roller being upwardly and elastically supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet feeding direction, wherein a plurality of the sheets conveyed into between said feed roller and said friction roller are separated and are conveyed one by one to said image forming device; and

a pressing device configured to provide a cyclic change in the pressure applied between said feed roller and said friction roller, said pressing device being arranged at a side of said friction roller.

37. The image forming apparatus of claim 35, wherein said pressing device uses a magnetic force, and said pressing device provides the cyclic change in the pressure more than one time as said reverse roller makes one rotation.

38. The image forming apparatus of claim 36, wherein said pressing device uses a magnetic force, and said pressing device provides the cyclic change in the pressure more than one time as said friction roller makes one rotation.

39. The image forming apparatus of claim 25, wherein said sheet feeding device includes a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

40. The image forming apparatus of claim 35, wherein said sheet feeding device includes a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

41. The image forming apparatus of claim 36, wherein said sheet feeding device includes a sheet guiding member configured to regulate advancement of the sheets downstream of said feed roller in the sheet feeding direction.

42. The image forming apparatus of claim 25, wherein all three, of said feed roller, said separation member, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from said image forming apparatus.

43. The image forming apparatus of claim 35, wherein all three, of said feed roller, said reverse roller, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from said image forming apparatus.

44. The image forming apparatus of claim 36, wherein all three, of said feed roller, said friction roller, and said pressing device, are integrally constructed as an unit, which is attachable to and detachable from said image forming apparatus.

45. A sheet feeding device comprising:

a feed roller;

separation means for separating sheets conveyed between said feed roller and said separation means, said separation means being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation means; and

pressing means for cyclically providing a change in the pressure applied between said feed roller and said separation means.

46. A sheet feeding device comprising:

a feed roller;

a reverse roller pressed against and into contact with said feed roller with a pressure applied between said feed roller and said reverse roller, said reverse roller being upwardly supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said reverse roller being supported at a free end side of said axis and arranged via a torque limiter, so as to be rotated in a sheet feeding direction and a reverse direction, wherein sheets conveyed into a position between said feed roller and said reverse roller are separated and are conveyed one by one; and

pressing means for providing a cyclic change in the pressure applied between said feed roller and said reverse roller, said pressing means being arranged at a side of said reverse roller.

47. A sheet feeding device comprising:

a feed roller;

a friction roller pressed against and into contact with said feed roller with a pressure applied between said feed roller and said friction roller, said friction roller being upwardly and elastically supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet

feeding direction, wherein sheets conveyed into a position between said feed roller and said friction roller are separated and are conveyed one by one; and

pressing means for providing a cyclic change in the pressure applied between said feed roller and said friction roller, said pressing means being arranged at a side of said friction roller.

48. An image forming apparatus comprising:

image forming means for forming an image; and

sheet feeding means for conveying a sheet to said image forming means, wherein said image forming means, for forming the image, forms the image on the sheet conveyed from said sheet feeding means, and said sheet feeding means includes a feed roller and a separation means, said separation means for separating an uppermost sheet from a plurality of sheets conveyed into a position between said feed roller and said separation means, said separation means being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation means; and

pressing means for cyclically providing a change in the pressure applied between said feed roller and said separation means.

49. An image forming apparatus comprising:

image forming means for forming an image;

sheet feeding means for conveying a sheet to said image forming means, said sheet feeding means including a feed roller and a reverse roller, said reverse roller being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said reverse roller, said reverse roller being upwardly supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said reverse roller being supported at a free end side of said axis and arranged via a torque limiter, so as to be rotated in a sheet feeding direction and a reverse direction, wherein sheets conveyed into a position between said feed roller and said reverse roller are separated and are conveyed one by one to said image forming means; and

pressing means for providing a cyclic change in the pressure applied between said feed roller and said reverse roller, said pressing means being arranged at a side of said reverse roller.

50. An image forming apparatus comprising:

image forming means for forming an image;

sheet feeding means for conveying a sheet to said image forming means, said sheet feeding means including a feed roller and a friction roller, said friction roller being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said friction roller, said friction roller being upwardly and elastically supported by an axis, said axis being supported at one side thereof and being rotated by a driving gear and a gear engaged with said driving gear, said friction roller being arranged at a free end side of said axis via a torque limiter, so as to be rotated only in a sheet feeding direction, wherein sheets conveyed into a position between said feed roller and said friction roller are separated and are conveyed one by one to said image forming means; and

pressing means for providing a cyclic change in the pressure applied between said feed roller and said friction roller, said pressing means being arranged at a side of said friction roller.

51. A method of forming an image on a sheet, the method comprising the steps of: conveying a plurality of the sheets between a feed roller and a separation member, said separation member being pressed against and into contact with said feed roller with a pressure applied between said feed roller and said separation member;

separating and conveying the sheets conveyed between said feed roller and said separation member one by one to an image forming device;

providing a cyclic change in the pressure applied between said feed roller and said separation member; and

forming the image on one of the sheets conveyed between said feed roller and said separation member using said image forming device.

52. The method of claim 51, wherein the cyclic change in the pressure is provided from a side of said feed roller.

53. The method of claim 51, wherein the cyclic change in the pressure is provided at a low frequency.

54. The method of claim 51, wherein said feed roller is cyclically pressed for providing the cyclic change in the pressure.